

K6YQT

PAARA NEWSLETTER
VOLUME 50 NUMBER 2 February 2001

W6OTX

PAARA



Celebrating 64 years as an active ham
Newsletter for the Palo Alto Amateur Radio Association, Inc.

this is your last issue of PAARagraphs
PAARA Membership Dues
\$12 per year
Pay to PAARA, include your call with payment



CALENDAR



- Feb.....2, **PAARA Meeting**, 7:30
Menlo Park Recreation Center
700 Alma Street, Menlo Park
- Feb.....7, **PAARA Board Meeting**, 7:30
Red Cross Bld., 400 Mitchell Ln., Palo Alto
- Mar.....2, **PAARA Meeting**, 7:30
- Mar.....7, **PAARA Board Meeting**, 7:30
- Apr.....6, **PAARA Meeting**, 7:30
- Apr.....11, **PAARA Board Meeting**, 7:30
- 2 m CODE PRACTICE, 2000 to 2030 PST Tues
N6NFI 145.23 repeater
Also try 7.100 for 24 hr code practice

PROGRAM

February 2, 2001
7:30 P.M.

Speaker:

James Cutler-KF6RFX
Space System Development Laboratory
at Stanford University

**"Amateur Radio Ground Station Command
and
Control Over the Internet"**
(see page 10)

Join us for pre-meeting eyeball

6 pm— at Su Hong Restaurant, 1039 El Camino Real, Menlo Park

—PAARA Radio NET every Monday evening at 8:30 P.M., local time—
on the 145.230 -600 MHz repeater, PL tone off

Board of Directors Meeting

2001 January 10
Red Cross Bldg, Palo Alto

Wally, K6URO, PAARagraph's editor, handed over to me two containers of archives from the good old days and I noticed among the stuff a plaque dated 1952 for FD awarded to PAARA by the Pacific Division Field Day Awards committee (of the ARRL). It depicts men and women, hands stretched overhead, pointing to a laurel wreath, gold leaf on brown wood. Wouldn't it look nice hanging in the club museum? A club (and non profit corporation) like ours with no fixed office space has to rotate the artifacts of institutional memory through current members. Anyone who knows of any such jewels please let me know so I can construct an inventory with guardians listed and report on same to the membership and for the record.

Andreas, N6NU, Chair, logged us all in to establish quorum. The President's report included a review of Andrea's project to utilize packet, GPS, the APRS network and coffee pots (w/ hot coffee) to provide a useful public service, including reliable internet messaging, during disasters. We need to supplement rather than be redundant with our advanced, state wide, emergency disaster recovery system.

The secretary's report noted that Donald, KF6JMQ & I (WA6SBO) have been regularly using the Red Cross HF rig & antenna farm as we develop a plan to interact more w/ the Red Cross in emergency preparedness and provide any PAARA members w/ HF operating opportunities. The tribander antenna, the 40m dipole and an assortment of VHF and UHF antennas need RF pumped through them in order to achieve these ends. For contests Andreas emphasized we should use the club call sign, W6OTX, especially when logs are submitted for publication and awards.

Dick, KM6EP, our new VP, led an extensive discussion on the club's future projects. He prepared a white paper that kept us on tract to discuss quite a wide range of topics and potential projects.

The Board allocated \$250 to buy door prizes for the annual dinner to be held at Michaels on Shoreline Drive on the evening of January 19th. My tummy & junk box look forward to this.

73, - Jay, WA6SBO@ARRL.net

Miscellaneous Dates

Flea Market at Foothill (info at: <http://joslin.com/FleaMarket>)

PAARA Palo Alto Amateur Radio Association

meets 1st Friday 7:30 each month, Net 145.230 each Monday 8:30,
contact: Andreas Junge N6NU.....(650) 233 0843

EMARC Electronics Museum Amateur Radio Club

meets 4th Friday 7:30 each month,
contact: Sheldon Edelman 650-858-2176, Edelman@richochet.net

NCDXC Northern California DX Club

meets 2nd Friday 7:30 each month, repeater for member info 147.360, Thur 8:00PM,
contact: Bob Mammarella KB6FEC 408 729 1544.

NorCalQRP Northern California QRP Club

meets 1st Sunday each month,
contact: Jim Cates 3241 Eastwood Rd., Sacramento, CA 95821.

Perham Foundation,

contact: Jerry Tucker N6NV 650-961-3266

SPECS Southern Peninsula Emergency Communication System

meets each Monday 8:00PM on Net 145.27, 440.80 MHz, www.specsnet.org
contact: Tom Cascone, KF6LWZ, 650-688-0441, specs@svpal.org

SCARES South County Amateur Radio Emergency Service

meets 3rd Thursday 7:30 each month, San Carlos City Hall.
Net is on 144.45 & 444.50 (PL-100) 7:30 Monday evenings.
contact:

SCCARA Santa Clara County Amateur Radio Association

Operates W6UU repeater 146.385+ Nets: 2m, W6UU, 7:30 Mon; 10m,
28.385, 8:00 Thur. meets 2nd Mon each month.
contact: Jack Ruckman AC6FU

SVECS Silicon Valley Emergency Communications

Operates WB6ADZ repeater (146.115 MHz+)
contact: Lou Stierer WA6QYS 408 241 7999

WVARA West Valley Amateur Radio Association

operates W6PIY repeater 147.39+, 223.96, 441.875, 1286.2
meets 3rd Wed every month.
contact: Glen Lokke Jr. KE6NBO at 408 971 8626, or glokke@pacbell.net

Disaster Services,

PALO ALTO CHAPTER, American Red Cross

Meets 3rd Wed. each month 7:30PM,
HF, packet, BBS, ATV, OSCAR Gateway, NASA satellite,
contact: Alan Ball 650-688-0423.

SAN JOSE CHAPTER, American Red Cross

contact: Scott Hensley KB6UOO, 408 249 7093, sh@richochet.net

VE Exams, 3rd Saturday each month, 11AM, 145.23- PL=100Hz

American Legion Hall, 651 El Camino Real, R.C.
contact: Al Montoya at WB6IMX@worldnet.att.net

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(see "Calendar" for Board meeting times, visitors welcome)

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PAARA Website <http://www.qsl.net/paara/>

Webb site for propagation information:
www.arrl.org/wlaw/prop/

New Members:

Bea Shulman WB6WMH
(New Family Member—see Jack Shulman)
Eddie Mills KG6ENH
Ed Fraser WA6PVC

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Joel Wilhite KA7TXV
701 Menlo Oaks DR
Menlo Park, CA 94025

James Cutler-KF6RFX

**"Amateur Radio Ground Station Command and Control
Over the Internet"**

Working with advances in networking and embedded computer control, students in the Space System Development Laboratory at Stanford University are developing the capability of command and control of amateur radio ground stations over the Internet. Among the many uses, this capability permits system operations of remote distributed ground stations for telemetry exchanges with satellites. Known as project Mercury, the system provides direct human console control, remote human tele-operation, and script/program based autonomous amateur radio ground station control. According to James Cutler-KF6RFX, speaker and leader of the project, "When just a few strategically located stations are in operation, the idea of a globally connected worldwide ground station network will be a potential reality."



Guest Column

Ben's story

(occasionally we ask Hams with inspiring stories to write a guest column for PAARAgaphs. Here is the story of Ben Shupack from Redmond, WA.) -AB6SO

Hello. My name is **Ben Schupack, NW7DX** and I'm 16 years old. I have been a Ham for about 3 years. I got my Novice license in April 1998 and I was a Novice for about 5 months. After my fun experience as a Novice, I wanted to upgrade and get more privileges. I kind of kicked into action at that point and upgraded to a new class of license almost every month. After 10 months of being a Ham, I obtained my Amateur Extra Class license. I am the only Ham in my family, but my dad has shown some interest, off and on.

All of my operating is done on HF, pretty much exclusively on CW. My main rig is a Kenwood TS-570D(G), which is an excellent little radio for all of my CW work. It has many features including a variable DSP filter from 50Hz to 2000Hz, internal ATU, and great noise reduction. Recently, I received an SGC SG-2020 QRP radio in exchange for being in one of SGC's advertisements, and have been using that occasionally as well.

I also have many QRP rigs that I built, which work very nicely. Besides just lowering the power on my Kenwood, I have fun building and using QRP rigs. Some kits that I built are Red Hot Radio NC-20, Emtech ZM-2 ATU, TenTec 1320, Small Wonder Labs DSW-40 and NJQRP Rainbow Tuner. I use them both at home and on trips. It's really exciting to operate portable while camping, staying at someone's house, or just playing around at a park. It's awesome that so little power can make contacts all around the world.

Ever since my first contest, I was hooked. I enjoy pushing my station to the max to work as many people as I can. I started out just doing contesting at home, but I now have been doing some guest operating at large contesting stations, which is really fun. Pretty much all of my contesting is done on CW, but if SSB is used in the same contest, I try to get on the 'other' mode and work some guys. Most of my contest operating at home is done with QRP. I live in an area with tight restrictions where many people complain about anything. To keep the neighbors happy, I lower my power so as not to disturb them while they're watching Wheel of Fortune. Despite this very low power, I have won numerous awards and even First Place QRP in my division for quite a few contests. In the ARRL DX contest, I worked 112 countries with 5 watts!

All of my operating is done on HF and 99.9% CW. CW is by far my favorite mode and is really like another natural language to me. I get on CW everyday for at least a couple of hours talking with people, and with all this practice, I've turned into a pretty darn good CW op, if I do say so myself. I continuously get great comments about my fist and operating. Besides just regular QSOs, though, contests have also been a big part of my hamming. They have really brought my speed up (I can now copy over 50 wpm), and they let me get a feel for things I need

to change and make better in the shack. After operating contests from other locations with big beams and a whole bunch of power, it's not too much fun to come home to 100w and a loop, but I live with it.

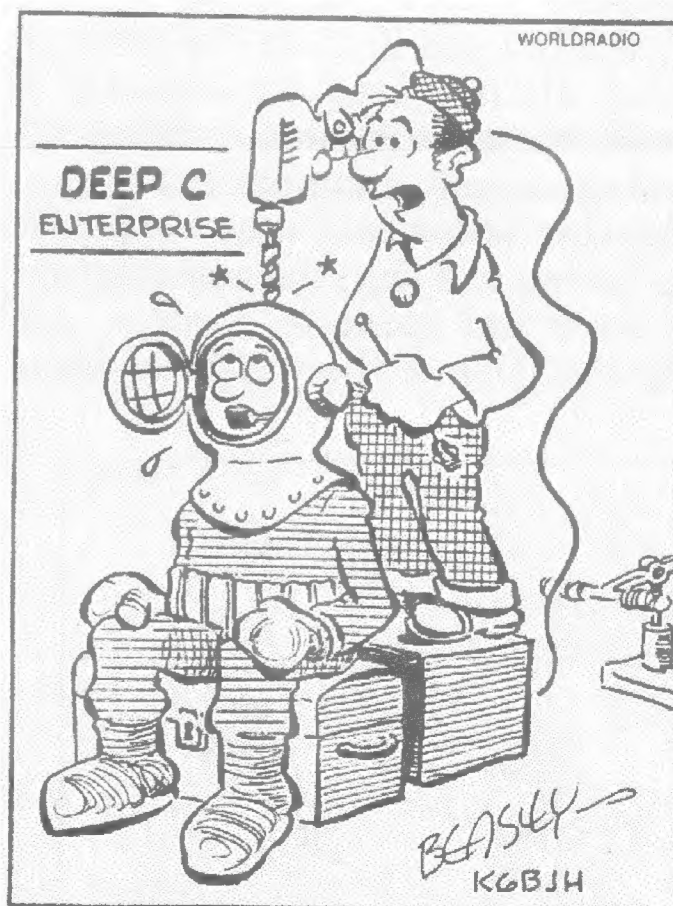
Besides Amateur Radio, I also love music. I play in both the High School Wind Ensemble and the Jazz Band. In the Wind Ensemble I play the Euphonium/Baritone horn and in the Jazz band I play the Trombone. I am first chair for both instruments and really enjoy what I play. This year I auditioned for the All-State band and made it in! I plan to keep on playing these instruments throughout high school and college, and will see where they take me.

73 and see you on the bands. **Ben, NW7DX**

Oh, I forgot to mention... I just found out that I am now a member of the A-1 OP club!! I was recommended by 2 other A-1 Ops. That always looks nice on the resume! I'm still waiting for the certificate though.

Hey, I wonder if in small print after the article, there could be "NW7DX is also a proud member of the A-1 Operators club" That wouldn't look half bad :-)

Well, 73/2, **Ben - NW7DX.**



I'VE ALWAYS WANTED TO TRY A QUARTER WAVE ROOF-MOUNT, OF COURSE, YOU'LL PROBABLY HAVE TO KEEP YOUR HEAD ABOVE WATER



WEB WANDERINGS

de Vic Black, AB6SO

Keith Lamonica W7DXX of N. Easton, MA has a new web site of considerable interest at <http://www.lamonica.com>. It's tied into the N2JEU Internet Remote Base Software site. Use a guest password for receive only listener access to the W7DXX HF Remote Base radio station controlled over the Internet. Apply for a secure password for full transceiver operation, which is available to licensed amateur operators only. This works similar to the way KFS handles ship-to-shore traffic with the transmitter located in Palo Alto, the receiver near Pigeon Point and control over telephone lines. Set up a similar system for your own use and you can avoid antenna restrictions or operate from a remote site while traveling. Some traditional operators may find this kind of evolution of tying Amateur Radio into the Internet a bit troubling, although it doesn't need to be. It's only another option for experimentation and adds a sort of pendulum effect to the hobby caused by innovation followed by periods of assimilation. It's just ordinary change, although a bit compressed in time now days.

Former Pacific Division ARRL Director Brad Wyatt K6WR describes the station: "The W7DXX Remote Base Station is located at N. Easton, MA, near Boston. It consists of a Kachina 505DSP remote controlled transceiver, an Ameritron AL-1500 linear amplifier, assorted antennas, Internet server and related software which can be controlled remotely by an IBM compatible PC with a soundcard. It is a VOX controlled SSB only system providing input and output audio and functional control over the Internet using Windows 98, an appropriate browser, Microsoft NetMeeting 3.01 and a combination headset and microphone. Currently, the antennas available are a Cushcraft (model MA5B) 20, 17, 15, 12, 10 meter beam with working rotator, a Cushcraft (model R8) 40 through 10 meter vertical, and a homebrew 75 meter dipole."

Software engineer Robert Arnold N2JEU from Canastota, NY said, "By using some software I wrote to provide radio control functions and Microsoft's free NetMeeting software to provide a two-way audio link, users are able to control and use the transceiver over the Internet without needing special software on their computers. Only an ordinary web browser and the free NetMeeting software are needed on a remote system. What can you do with it? In testing on the W7DXX remote base system, many users having antenna restrictions have had a taste of operating on HF frequencies that they might not have had otherwise. Have you ever wished that you could use your own home station while you were traveling? Now with a laptop system you can have access to your own home station over an ordinary dial-up Internet connection. Do you have a club that wants to make the club station available to your members even when they can't come to the station location? Have you ever wondered what it is like to be at the OTHER end of the pileup? How about an Internet to satellite gateway using full two-way voice operation when Phase 3D reaches orbit? These are just a

few of the many things that are possible when you connect your ham station to the Internet. What can YOU think of? All these and more are possible using readily available software and hardware." Robert's software was first written for the Kachina with follow up work being done for the Ten Tec Pegasus software radios. Software for other radios will follow soon.

Last month I reported on the Christchurch, New Zealand Amateur Radio Club ZL3AC Home Page club project paddle key. This month's paddle key project comes from Ulm, Germany. Go to <http://ulmnetz.de/HANNES/keyer.html> for a kit that makes a small paddle that pulls out of a case for use, and then pushes back inside for storage. It can be mounted in several ways, including a magnetic mount. This one's about US \$50.

Worldwide Utility News has an excellent paper on digital HF (and some VFH/UHF) mode formats located at <http://www.wunclub.com/digfaq/signals/html>. In this case, utility listening is a Short Wave Listeners' (SWL) term that refers to monitoring commercial and other communications. It's of interest to Amateurs since it describes all common digital modulation schemes used by Amateurs as well as an enormous number of schemes most Amateurs have never heard of. Many of these are used solely for military or diplomatic communications and are usually encrypted. You may want to know about them, though, if you experiment with digital modes. Also, if you hear some strange noise on the air, you have a better chance of identifying the source of the signals after reading this tutorial. The author is quick to point out "that the more efficient a modulation/coding method is, the more noise-like it must become. I have heard it said in some digital groups that 'Any sufficiently advanced communication is indistinguishable from noise'."

Many of the schemes are proprietary and no information about them is available, even from the manufacturers, who may have created the modulation schemes under secret military contract. The information on this web site is all gleaned from public domain sources, though, and is appropriate reading material if you are interested in advancing the state of the art in Amateur digital modes. Many Amateurs complain that we are falling behind because we haven't gone fully digital like most of the rest of the world. Bear in mind, though, that some of these schemes require more bandwidth than Amateur modulation schemes now use and are therefore inappropriate for Amateur use.

Phil Wheeler W7OX suggests an article of interest at the Elecraft web site. Go to <http://www.elecraft.com>. Click on the 'Tech Notes' icon at the lower right corner of the main page. The featured article, 'An Overview of Software DSP for Weak Signal Enhancement', is a way to try Digital Signal Processing (DSP) without adding a DSP unit to your radio. The scheme uses your computer's Sound Blaster card for generating DSP filters on the fly.

A handy URL to bookmark is <http://www.euramcom.freemove.co.uk>. You'll find cross-references from US to British and European standards for writing and marking values of resistors, capacitors, wires, tubes and semiconductors. This is good to know if you read construction articles from foreign magazines.

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PAARA PONDERINGS

de VIC BLACK, AB6SO

PAARA members **Ben Friedlander AD6JA** and son **Erik KF6VFX** are proud to announce that **Mom, Lori Shapiro**, is now **KG6EED**.

The first major activity of the new year, the joint PAARA/FARS Winter Party, was a great success. Thanks to Foothill Amateur Radio Society for setting up the venue at Michael's at Shoreline in Mountain View. Michael's is a catering banquet service, not a restaurant, so they specialize in parties such as our Winter Party. The food was great, the service was great and the companionship of our fellow Amateur operators was very gratifying. We were pleased to furnish the speaker for the evening, **Garry Shapiro NI6T**, who presented the Kingman Reef DXpedition K5K. As quite often happens, we were the first club to hear about the DXpedition. The last time that happened, **Tom Schiller NB6T** of Force 12 Antennas stepped off the plane in San Francisco and drove directly to PAARA from the first Amateur operation in Myanmar in over 40 years. We are continuing our fine reputation for having the first talks or the first published discussions in PAARAgaphs months ahead of other publications.

This is a good time to plan some new activities for the year 2001. Five years ago **Chuck Adams K5FO** suggested a "Thirty Meters Propagation Study" to stimulate use of the 3,000 NorCal 38 Special transceivers that were built at that time. After moving to Prescott, Arizona and changing his call sign to **K7QO**, Chuck decided that the start of the new millennium would be a good time for another propagation study at the peak of the sunspot cycle. Since contests are not allowed on 30 meters, this is not classified as a contest. It's each person for him or herself. Set your own goals and check out this under-used band. Dates: January 10, 2001 to November 11, 2001 (1/10/01 0001UTC to 11/11/01 1111UTC). Note the play on 1's as this is the first year of the new century and millennium. Use 30 meters only (10.100 to 10.150MHz) any time 24 hours per day. Chuck suggests using QRP (5 watts or less) for this study, but if you want to participate at higher levels don't feel guilty.

Since 30 meters is restricted to Data and CW, you can use CW, RTTY, PSK-31, etc. Most participants will use CW, but this is a chance to work all states using PSK, RTTY, or other digital modes. The purpose is to check out 30 meters propagation. Everyone starts out with all counters set to zero. You get bragging rights for your accomplishments. Make up your quantitative measure: WAS count, DXCC count, WASTP (WAS Total Power), best miles/watt, etc. Set your own goals and establish your own challenges. Chuck's goals include WAS at 500mW and DXCC count of 111 countries at 500mW plus 1,111 of 3,076 US counties on 30 meters at 500mW. Chuck said, "Remember that this is not a contest. This is for you to get on the air. It is all friendly interplay to generate on the air activities. Keeps some from getting bored. We can't play sports so we do the next best thing. We beat on each other. It's

all mental gymnastics and exercise."

Here are some things that **Chuck** (as **K5FO**) learned from the original 1996 propagation study: "You can work Hawaii at 3 a.m. from TX with an Off Center Fed dipole and 0.95W. We share the band with commercial stations at 10.102, 10.106, 10.112, 10.128 or so, and some more. So if you hear SSB or digital anywhere on the band do not go into vigilante mode and try to interfere with these stations. Just move off somewhere else. You can lose your license for fooling around where you should not. During all hours you can hear one of the digital stations go into idle mode and you hear only a constant carrier. Again, it is not a ham with a book on the key. There are a number of slow speed CW stations on daily between 10.135 and 10.150MHz. By slow speed I mean 8-15 WPM or so. Those looking for code practice would do well to check this out. The 30-meter band is open almost 24 hours a day. It seems dead a lot of the time because of lack of use. Antennas are shorter than for 40 meters. The band isn't that crowded. The people on 30 meters are friendly in general. Maximum power is 200W for US stations and most of the rest of the world."

We may need to reinvent our role in emergency communications in the very near future. One of the reasons Amateurs are allowed to use so much spectrum is the fact that we can rally communications in times of emergencies. Each of us has fully independent, but compatible, equipment and many of us are trained to coordinate communications among many public service groups. That may all be changing soon. According to Amateur Radio Newline, the FCC has allocated spectrum in the 700 MHz range to a new nation-wide Inter-Service Agency, which will use the spectrum to allow local, state and federal disaster relief agencies using different radio systems to communicate directly among themselves without the need for using Amateurs as intermediaries.

The spectrum in question is currently assigned to analog television channels 60 - 69, but stations using those channels will be required to convert to digital and clear out the frequencies by the year 2006. Thirty-two channels have been set aside for use by the new service. This will be somewhat analogous to CLEMARS, or the California Law Enforcement Mutual Aid Radio Service, which already operates in California. With only thirty-two channels available there will still be functions that we can perform better than others, such as portable slow scan TV, GPS enabled APRS and the transfer of large amounts of non strategic data using packet, Pactor and other modes. However, 6 years is a long time for commercial entities to develop new forms of communications to replace the services traditionally performed by ARES, RACES and REACT.

A lot of advances have been made in digital communications during the past couple of years. We're not just talking about VHF packet, but also digitizing voice and video using simple computer/radio interfaces and free software downloaded from the Internet. PAARA's Board of Directors is getting information together to allow our club members to more fully participate in experimenting with digital modes this year. Stay tuned for information as it becomes available.

Amateurs are more adept at using photovoltaic cells and

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maintaining batteries than most consumers. This may become a major new interest for many Amateurs. Interest in emergency power supplies will probably peak in the near future as a result of the recent power emergencies we've been experiencing. De-regulation of the power utilities was intended to break up monopolies and increase competition. Vertically integrated companies such as Pacific Gas and Electric, Southern California Edison and San Diego Gas and Electric were forced to sell power-generating plants at the same time that a price cap was put on power sales by the three companies. Environmental concerns have prevented the construction of new power plants in California so that nearly half of our power now comes from out of state sources that depend on hydroelectric plants. A very dry winter has resulted in low water levels at those plants while very hot or very cold weather increased demand in California. With demand exceeding supply, this led to a financial shortfall for the California utilities. The result is that the power distributors refused to sell to California companies for fear they wouldn't be paid. So the moral of the story is that we should start studying alternative power sources for our radio stations. Let your club directors and officers know if you are interested in either the new data modes or alternative power sources.

-Vic Black, AB6SO

The less secure a man is, the more likely he is to have extreme prejudices.

© Clint Eastwood

(Continued from page 13) Web Wanderings

Peter Hodgson VA3PKH has assembled a nice collection of Amateur Radio applications for the Palm Operating System. It's worth revisiting every now and then for new updates. His Palm/Ham page is located at <http://www.qsl.net/va3pkh/palm-ham.html#logging> and includes access to 45 programs for DXing, Homebrew, Information/Lists, Logging, Morse Code, Packet/APRS, VHF/UHF/Weak Signal, Satellites and Scanning.

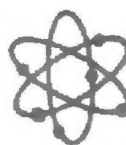
Thanks to Richard Tidd KE6HNY, the Deputy Chief RACES Officer for San Mateo County Sheriff's Office of Emergency Services, who has made his Northern California ARES/RACES/ACS/SAR/VIP Frequencies List available on line at <http://www.quickbase.com/db/6sa4rmya>. You can search frequency lists by service, county and frequency.

If you plan to travel this coming summer, check out the web site of Kenny Silverman K2KW who has been a guest speaker for PAARA in the past. Go to <http://pages.prodigy.net/k2kw> for a complete tutorial on how to plan for and organize a DXpedition.

-Vic Black, AB6SO

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PAARAgaphs accepts paid advertisements from non-members.
(short personal ads remain free for members in good standing).

All ad rates listed are per issue only.

1. Not for profit ads by association members for ham-related items and wants. No cost for business card size ads (additional space at \$2.50 per business card size).
2. For Profit organizations and/or individuals: \$5-business card size, \$25-half page, \$50 full page or back cover.

These fees may be reduced or waived in exchange for a valuable consideration that is given to the Association or its general membership. Such consideration must be in addition to any existing arrangements with the association.

The PAARAgaphs editors reserve the right to reject any ad deemed to be not in the best interest of the Association. All fees payable in advance by the year with "scanner-ready" copy or text-only ads. Give payment and copy to Bob Korte

PAARA · Palo Alto Amateur Radio Association · P.O. Box 911, Menlo Park, California 94026-0911

- Club meetings are on the first Friday of each month, 7:30pm at the Menlo Park Recreation Center, 700 Alma Street, Menlo Park, CA. •
- Radio NET every Monday evening, at 8:30pm, on the 145.230-600 MHz repeater, PL tone off. •

Membership in PAARA is \$12.00 per calendar year which includes a subscription to PAARAgaphs, \$6 for additional family members (no newsletter).

Make payment to the Palo Alto Amateur Radio Association.

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PAARAgaphs February 2001

Palo Alto Amateur Radio Association, Inc.
PAARAgaphs Newsletter
P.O. Box 911
Menlo Park, California 94026



FIRST CLASS MAIL

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(32 seconds) for download
Store pictures in memory
18 Color TFT LCD Display
Built-in Speaker • Mic
Download • PC
(with special software)
Call For Low Price!

TH-G71A 2m/440
• 2m/440 Dual Band HT
• 500 Mems • PC Programmable
• 6w 2m 5w 440 43.8 VDC
• Alpha Numeric Display
• CTCSS Built-in • Backlit Keypad
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TH-22AT
• Ultra Compact
• 2M HT • 3W Output
• Encase Built-in

KENWOOD
APRS
TNC Features
Built In!
TH-D7A 2M/440
• 2M/440 Dual Band
• Built-in 1200/9600 Baud TNC
• APRS Compatible
• DX Packet Cluster Monitor
• 200 Mems • CTCSS
• VOX • Messaging Control
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TS-670S HF Transceiver
• DSP in LF Stage • 100W 12V DC
• Dual mode noise reduction
• Digital Filtering (no opt. filters req.)
• Built-in RS232 Windows software incl.
Great Low Price!

TM-261A 2M Mobile
• 50W • Mid and Low • Ni-Spec
• 61 Mem. Channels • Alpha Numeric Function
• Dual Menu • 128K Memory
• Backlit mic & built-in-encoder
Call Now For Special Low Price!

TS-570DSG/TS-570SG DSP Enhanced
• 100W HF • 110W on 6M TS-570SG only
• DSP • CW Auto Tune • AutoTuner and 6M
• 8025 Radio Color LCD Display • Eject Keyer
• RP22 Radio Color Program Compatible
Call Now For Your Low Price!

TM-V7A 2M/440MHz
• 50W/35W • 280 Mems • Visual Scan
• Alpha Numeric • Enc/Dic & Duplex Built-in
• Computer Programmable • 9600 Baud Ready
• Color Blue Reversible LCD • Backlit Mic
Call Now For Low Price!

TS-50S HF Transceiver
• TS-50S World's smallest HF trans.
• SSB CW AM FM • 10W • 12V DC
• 6.5 lbs 7.18 x 2.4 x 9.25 • 100W out
• 105 db dynamic range 100 Mems
• Opt. ext. ant. tuners available
Call For Special Low Price!

TM-D700A 2M/440 Dualband
• 50W VHF 35W UHF • Opt. Voice Synthesizer
• Receiver 118-1300 mHz (cell blocked)
• Remote Head Inst. only (kit included)
• 200 Memories • Built-in 1200/9600 Baud TNC
• Advanced APRS Features
• DX Packet Cluster
• Tone Scan • GPS/VIC-HVPC Ports

TM74242D 2M/440MHz
• Optional 3rd band available • Backlit mic
• Up to 300 memories • 101 per band
• PL Encode built-in • Detachable front panel
Call Now For Your Low Price!